What is claimed is:

1. A method for segmenting a magnetic resonance image of interest of a left ventricle comprising the steps of:

determining a myocardium contour according to a graph cut of candidate endocardium contours, and a spline fitting to candidate epicardium contours in the absence of shape propagation; and

applying a plurality of shape constraints to the candidate endocardium contours and the candidate epicardium contours, to determine the myocardium contour, wherein a template is determined by shape propagation of a plurality of magnetic resonance images in a sequence including the magnetic resonance image of interest, in the presence of shape propagation.

2. A method for segmenting a magnetic resonance image of interest of a left ventricle comprising the steps of:

determining a myocardium response image according to a histogram of pixel intensity in magnetic resonance image of interest;

determining a plurality of candidate contours, according to a plurality of energy functions, to which a plurality of confidence values are assigned; and

applying a plurality of shape constraints to the candidate endocardium contours and the candidate epicardium contours to determine a myocardium contour.

3. The method of claim 2, wherein the myocardium contour is based on a plurality of magnetic resonance images in a sequence including the magnetic

resonance image of interest, wherein the myocardium contour includes an endocardium contour and an epicardium contour.

4. The method of claim 2, further comprising the step of determining an approximate contour pair of the left ventricle according to a plurality of points defined in a gray level profile of the image as an intersection of a plurality of cross sections of the left ventricle.

5. The method of claim 4, wherein the approximate contour pair is determined according to a Hough transform array to vote for a center position and a radius of a myocardium centerline.

6. The method of claim 2, wherein the step of determining the myocardium response image according to the histogram of pixel intensity further comprises the step of fitting a mixture of Gaussians to the histogram of pixel intensity to determine portions of blood, muscle and air in the image.

7. The method of claim 2, wherein for each candidate closed contour, the method further comprises the steps of:

defining a search space around an approximate contour;

defining a line of source nodes and sink nodes;

determining a shortest path between the source nodes and the sink nodes;

defining a new source node and a plurality of new sink nodes; and

determining a shortest path between the new source node and new sink nodes.

8. The method of claim 2, wherein the candidate endocardium contours and the candidate epicardium contours are each determined according to a combination of a gradient magnitude and a direction using a cross product of a gradient direction and a contour direction.

9. The method of claim 8, further comprising the steps of:

determining a first candidate endocardium contour according to a positive cross product of a gradient direction in the input image and a contour direction;

determining a second candidate endocardium contour according to a negative cross product of a gradient direction in the myocardium image and a contour direction;

determining a first candidate epicardium contour according to a gradient magnitude in the input image; and

determining a second candidate epicardium contour according to a positive cross product of a gradient direction in the myocardium image and a contour direction.

11. The method of claim 2, further comprising the step of determining a one-to-one match matrix, wherein points on the endocardium contour and epicardium contour are assigned to a plurality of template points, wherein the

template points are determined from propagation through a plurality of magnetic resonance images.

12. A method for segmenting a magnetic resonance image of interest of a left ventricle comprising the steps of:

determining a myocardium response image according to a histogram of pixel intensity in magnetic resonance image of interest;

determining a plurality of candidate contours, according to a plurality of energy functions, to which a plurality of confidence values are assigned;

determining a myocardium contour according to a graph cut of candidate endocardium contours, and a spline fitting to candidate epicardium contours in the absence of shape propagation; and

applying a plurality of shape constraints to the candidate endocardium contours and the candidate epicardium contours to determine the myocardium contour, wherein a template is determined by shape propagation of a plurality of magnetic resonance images in a sequence including the magnetic resonance image of interest, in the presence of shape propagation.

13. The method of claim 12, wherein the myocardium contour includes an endocardium contour and an epicardium contour.

14. The method of claim 12, further comprising the step of determining an approximate contour pair of the left ventricle according to a plurality of points defined in a gray level profile of the image as an intersection of a plurality of cross sections of the left ventricle.

15. The method of claim 14, wherein the approximate contour pair is determined according to a Hough transform array to vote for a center position and a radius of a myocardium centerline.

16. The method of claim 12, wherein the step of determining the myocardium response image according to the histogram of pixel intensity further comprises the step of fitting a mixture of Gaussians to the histogram of pixel intensity to determine portions of blood, muscle and air in the image.

17. The method of claim 12, wherein the closed contour includes aplurality of candidate contours, and for each contour, further comprises the steps of:

defining a search space around an approximate contour;

defining a line of source nodes and sink nodes;

determining a shortest path between the source nodes and the sink nodes;

defining a new source node and a plurality of new sink nodes; and

determining a shortest path between the new source node and new sink nodes.

18. The method of claim 12, wherein the candidate endocardium contour and the candidate epicardium contour are each determined according to a combination of a gradient magnitude and a direction using a cross product of a gradient direction and a contour direction.

19. The method of claim 18, further comprising the steps of:

determining a first candidate endocardium contour according to a positive cross product of a gradient direction in the input image and a contour direction;

determining a second candidate endocardium contour according to a negative cross product of a gradient direction in the myocardium image and a contour direction;

determining a first candidate epicardium contour according to a gradient magnitude in the input image; and

determining a second candidate epicardium contour according to a positive cross product of a gradient direction in the myocardium image and a contour direction.

20. The method of claim 12, wherein the graph cut further includes the steps of:

defining a graph wherein each node corresponds to a connected component region between confidence pixels on the candidate contours; and

determining a minimum cut between a center node and an outside node.

21. The method of claim 12, wherein the spline fitting further includes the step of fitting a spline through points of the candidate contours.

22. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for segmenting a magnetic resonance image of interest of a left ventricle, the method steps comprising:

determining a myocardium response image according to a histogram of pixel intensity in magnetic resonance image of interest;

determining a plurality of candidate contours, according to a plurality of energy functions, to which a plurality of confidence values are assigned;

determining a myocardium contour according to a graph cut of candidate endocardium contours, and a spline fitting to candidate epicardium contours in the absence of shape propagation; and

applying a plurality of shape constraints to the candidate endocardium contour and the candidate epicardium contours to determine the myocardium contour, wherein a template is determined by shape propagation of a plurality of magnetic resonance images in a sequence including the magnetic resonance image of interest, in the presence of shape propagation.